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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PECHE, JORGE O	
ART UNIT	**PAPER NUMBER**
3664	

MAIL DATE	DELIVERY MODE
11/29/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/829,153	SUITA ET AL.	
	Examiner	Art Unit	
	Jorge O. Peche	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) *7* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

KHOI H. TRAN
SUPERVISORY PATENT EXAMINER

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/11/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Receipt is acknowledged of applicant's argument/remarks filed on September 4, 2007, **claims 1-6** are pending and an action on the merits is as follows.

Applicant's arguments with respect to amended **claims 1-6** have been fully considered but are moot in view of the new ground(s) of rejection. Applicant has cancelled **claim 7,** and **claim 6** objection has been withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims **1-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sutherland et al. (Patent No.: US 7,155,316 B2).**

Regarding **claim 1-2**, Sutherland discloses a microsurgical robot process comprising the step of:

- Building a restrain (35) and fiducial markets (36) (physical safety barrier) where the robot's forceps operates (movable robot) (see col. 15, line 55 – col. 16, line 66; Figures 10-13).
- Defining virtual no-go boundaries and a trajectory of an end effector tool (26) in a workstation-recording device, computer (21). The end effector tool is mounted on a robot arm (102/103) (see column 2, lines 66- column 3, lines 11; column 5, lines 21-37; column 6, lines 54-62; column 9, lines 41-48; column 11, lines 56-column 12, lines 3; column 12, lines 45-53; column 16, lines 45-column 17, lines 11; Figures 1, 12-17). Under this process, the robot end effector operates with in the restrain (35) and fiducial markets (36) (physical safety barrier).
- Defining a robot system with two movable arms each carried on a wheeled base with each arm having a six of degrees of freedom of movement, an end effector which can be rolled about its axis and an actuator which can slide along the axis for operating different tools (at least two three-dimensional spatial regions) (see abstract, column 5, lines 35-37; Figures 2-3, 7, and 10).
- Calculating safe trajectories (movement trajectory) for the surgical corridor by providing the surgeon a means of navigation, target location and collision avoidance, and defining the virtual no-go boundaries (see column 6, lines 54-62; column 9, lines 41-48). Under this process, the system can continuously update the position of the robot tool in relation to the surgical target

(determining a predicted position/ three-dimensional spatial region based on the trajectory calculation) (see col. 4, lines 42-67).

However, Sutherland fails to disclose in detail a method for matching the prediction position of each of the defined three-dimensional spatial regions with said virtual safety barrier; and carrying out a control to start the braking of the arm at a predetermined distance ahead of the virtual safety barrier and stop the movement of the arm ahead of the virtual safety barrier if it is determined that any one of the three-dimensional spatial regions in at least -one predicted position thereof based on the trajectory calculations will come into contact with said virtual safety barrier.

However, as Sutherland discloses a surgical simulation software on the workstation to allow the surgeon to plan the point of cranial trepanation (a set of point, a set of lines or an envelope sphere), to calculate safe trajectories for the surgical corridor, and define the virtual no-go boundaries, it would be obvious for the microsurgical robot system to match the predicted position of the two movable arm (three-dimensional spatial) with the virtual no-go boundaries to prevent inadvertent injury to patient neural system (see column 6, lines 54-61, column 9, lines 40-48). Therefore, under this process, it would also be obvious that the computer (21) in workstation (11) and the controller (12) would coordinate a stop process/mechanism to terminate any rotation and/or position change in the robot joint and/or link to compel the virtual no-go boundaries.

Doing so would enhance a precise microsurgical robot system capable to control two mobile arms, each of them having six degrees of freedom.

Regarding **claims 3-4**, Sutherland discloses a microsurgical robot system comprising:

- A mean for building a restrain (35) and fiducial markets (36) (physical safety barrier) where the robot's forceps operates, and a workstation (11) for defining no-go boundaries and a trajectory of the end effector tool (26) in a workstation-recordable device, computer (21), where the no-go boundary being inside the restrain (35) and fiducial markets (36) (see column 2, lines 66- column 3, lines 11; column 5, lines 21-37; column 6, lines 54-62; column 9, lines 41-48; column 11, lines 56-column 12, lines 3; column 15, line 55 – column 16, line 66; column 16, lines 45-column 17, lines 11; Figures 1, 10-17).
- A robot manipulator (10) and controller (12) for defining a robot system with two movable arms each carried on a wheeled base with each arm having a six of degrees of freedom of movement, an end effector which can be rolled about its axis and an actuator which can slide along the axis for operating different tools (at least two three-dimensional spatial regions) (see abstract, column 11, lines 56-column 12, lines 10; column 12, lines 54-column 13, lines 5; column 5, lines 35-37; Figures 1-3, 7, and 10).
- A mean for calculating safe trajectories (movement trajectory) for the surgical corridor by providing the surgeon a means of navigation, target location and collision avoidance, and defining the virtual no-go boundaries (see column 6, lines 54-62; column 9, lines 41-48). Under this process, the system can continuously update the position of the robot tool in relation to the surgical target

(determining a predicted position/ three-dimensional spatial region based on the trajectory calculation) (see col. 4, lines 42-67).

However, Sutherland fails to disclose in detail an apparatus comprising means for determining whether or not at least a part of the predicted position of any one of the defined three-dimensional spatial regions, based on trajectory calculations will come into contact with said virtual safety barrier; and control means for starting the braking of the arm at a predetermined distance ahead of the virtual safety barrier and stopping the movement of the arm including the three-dimensional spatial region if it is determined that at least a part of the predicted position of the three-dimensional spatial comes into contact with said virtual safety barrier.

However, as Sutherland discloses a surgical simulation software on the workstation to allow the surgeon to plan the point of cranial trepanation (a set of point, a set of lines or an envelope sphere), to calculate safe trajectories for the surgical corridor, and define the virtual no-go boundaries, it would be obvious for the microsurgical robot system to match the predicted position of the two movable arm (three-dimensional spatial) with the virtual no-go boundaries to prevent inadvertent injury to patient neural system (see column 6, lines 54-61, column 9, lines 40-48). Therefore, under this process, it would also be obvious that the computer (21) in workstation (11) and the controller (12) would coordinate a stop process/mechanism to terminate any rotation and/or position change in the robot joint and/or link to compel the virtual no-go boundaries.

Doing so would enhance a precise microsurgical robot system capable to control two mobile arms, each of them having six degrees of freedom.

Regarding **claims 5-6**, Sutherland discloses a microsurgical robot system having a controller device (12) to limit movement of one or both robot arms, and a workstation (11) for defining no-go boundaries and a trajectory of the end effector tool (26) in a workstation-recordable device, computer (21) (see abstract; column 2, lines 66- column 3, lines 11; column 5, lines 21-37; column 6, lines 54-62; column 9, lines 41-48; column 11, lines 56-column 12, lines 8; column 13, lines 16-28; column 16, lines 45-column 17, lines 11; Figures 1, 12-17).

Response to Argument

In the Applicant's arguments/remarks filed on September 4, 2007, with respect to the rejections of **claims 1-6** under 35 U.S.C. 102(e) as being unpatentable over **Sutherland et al. (Patent No.: US 7,155,316 B2)** have been fully considered but are not persuasive.

Regarding Applicant's first argument (page 6, par. 1) "Sutherland fails to teach 'constructing a physical safety barrier around a movable robot' or 'defining ...a virtual safety barrier ..., the virtual safety barrier being set inside the physical safety barrier'." The Examiner respectfully disagrees. A thought reading of Sutherland's reference reveals that what is argued is clearly supported. Applicant is kindly invited to consider the reference as a whole and for this argument, concentrate on Sutherland's abstract; column 11, lines 56-column 12, lines 10; column 12, lines 54-column 13, lines 5; column

5, lines 35-37; column15, line 55- column 16, line 66; Figures 1-3, 7, and 10-13. Furthermore, Applicant is kindly invited to consider the above Office Action for more detail comment.

Regarding Applicant's second argument (page 6, par. 2), "Sutherland fails to disclose how the "no-go" boundaries are defined or how to prevent the arms from entering the "no-go" boundaries. Sutherland also fails to teach or disclose 'defining at least two three-dimensional spatial region including parts of the arm of the robot including said work or toot' or '... braking of the arm at a predetermined distance ahead of the virtual safety barrier ... if it is determined that any one of the three-dimensional spatial regions ... will come into contact with said virtual safety barrier,, as required in claims 1 and 3." The Examiner respectfully disagrees. A thought reading of Sutherland's reference reveals that what is argued is clearly supported. Applicant is kindly invited to consider the reference as a whole and for this argument, concentrate on Sutherland's abstract; column 6, lines 54-62; column 11, lines 56-column 12, lines 10; column 12, lines 54-column 13, lines 5; column 5, lines 35-37; column 9, lines 41-49; column 15, line 55 - column16, line 66; Figures 1-3, 7, and 10-13. Furthermore, Applicant is kindly invited to consider the above Office Action for more detail comment.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jorge O. Peche whose telephone number is 571-270-1339. The examiner can normally be reached on 8:30 am - 5:30 pm Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoi H. Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jorge O. Peche

Patent Examiner
Art Unit 3664
November 20, 2007

KHOI H. TRAN
SUPERVISORY PATENT EXAMINER